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EXAMINER

PHAN, THAI Q

ART UNIT PAPER NUMBER

2128

DATE MAILED: 01/15/2004

Please find below and/or attached an Office communication concerning this application or proceeding.

# Office Action Summary

Application No.  
09/340,580

Applicant(s)  
Chung-Wah Norris Ip

Examiner  
Thai Phan

Art Unit  
2128



-- The MAILING DATE of this communication appears on the cover sheet with the correspondence address --

## Period for Reply

A SHORTENED STATUTORY PERIOD FOR REPLY IS SET TO EXPIRE 3 MONTH(S) FROM THE MAILING DATE OF THIS COMMUNICATION.

- Extensions of time may be available under the provisions of 37 CFR 1.136 (a). In no event, however, may a reply be timely filed after SIX (6) MONTHS from the mailing date of this communication.
- If the period for reply specified above is less than thirty (30) days, a reply within the statutory minimum of thirty (30) days will be considered timely.
- If NO period for reply is specified above, the maximum statutory period will apply and will expire SIX (6) MONTHS from the mailing date of this communication.
- Failure to reply within the set or extended period for reply will, by statute, cause the application to become ABANDONED (35 U.S.C. § 133).
- Any reply received by the Office later than three months after the mailing date of this communication, even if timely filed, may reduce any earned patent term adjustment. See 37 CFR 1.704(b).

## Status

- 1) ☒ Responsive to communication(s) filed on Oct. 27, 2003
- 2a) ☐ This action is FINAL. 2b) ☒ This action is non-final.
- 3) ☐ Since this application is in condition for allowance except for formal matters, prosecution as to the merits is closed in accordance with the practice under *Ex parte Quayle*, 1935 C.D. 11; 453 O.G. 213.

## Disposition of Claims

- 4) ☒ Claim(s) 1-41 is/are pending in the application.
- 4a) Of the above, claim(s) \_\_\_\_\_ is/are withdrawn from consideration.
- 5) ☐ Claim(s) \_\_\_\_\_ is/are allowed.
- 6) ☒ Claim(s) 1-41 is/are rejected.
- 7) ☐ Claim(s) \_\_\_\_\_ is/are objected to.
- 8) ☐ Claims \_\_\_\_\_ are subject to restriction and/or election requirement.

## Application Papers

- 9) ☐ The specification is objected to by the Examiner.
- 10) ☒ The drawing(s) filed on Jun 28, 1999 is/are a) ☒ accepted or b) ☐ objected to by the Examiner.  
Applicant may not request that any objection to the drawing(s) be held in abeyance. See 37 CFR 1.85(a).
- 11) ☐ The proposed drawing correction filed on \_\_\_\_\_ is: a) ☐ approved b) ☐ disapproved by the Examiner.  
If approved, corrected drawings are required in reply to this Office action.
- 12) ☐ The oath or declaration is objected to by the Examiner.

## Priority under 35 U.S.C. §§ 119 and 120

- 13) ☐ Acknowledgement is made of a claim for foreign priority under 35 U.S.C. § 119(a)-(d) or (f).  
a) ☐ All b) ☐ Some\* c) ☐ None of:
- ☐ Certified copies of the priority documents have been received.
  - ☐ Certified copies of the priority documents have been received in Application No. \_\_\_\_\_.
  - ☐ Copies of the certified copies of the priority documents have been received in this National Stage application from the International Bureau (PCT Rule 17.2(a)).

\*See the attached detailed Office action for a list of the certified copies not received.

- 14) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. § 119(e).  
a) ☐ The translation of the foreign language provisional application has been received.
- 15) ☐ Acknowledgement is made of a claim for domestic priority under 35 U.S.C. §§ 120 and/or 121.

## Attachment(s)

- 1) ☒ Notice of References Cited (PTO-892)
- 2) ☐ Notice of Draftsperson's Patent Drawing Review (PTO-948)
- 3) ☐ Information Disclosure Statement(s) (PTO-1449) Paper No(s). \_\_\_\_\_
- 4) ☐ Interview Summary (PTO-413) Paper No(s). \_\_\_\_\_
- 5) ☐ Notice of Informal Patent Application (PTO-152)
- 6) ☐ Other:

### DETAILED ACTION

This Office Action is in response to applicant's amendment filed on Oct. 27, 2003.

Claims 1-41 are in pending.

#### *Drawings*

1. This application has been filed with drawings which are acceptable for examination.

#### *Claim Rejections - 35 USC § 112*

2. Due to applicant's amendment to the claim, the 112, 2nd Paragraph rejection to claim 38 is withdrawn.

#### *Claim Rejections - 35 USC § 103*

3. The following is a quotation of 35 U.S.C. 103(a) which forms the basis for all obviousness rejections set forth in this Office action:

(a) A patent may not be obtained though the invention is not identically disclosed or described as set forth in section 102 of this title, if the differences between the subject matter sought to be patented and the prior art are such that the subject matter as a whole would have been obvious at the time the invention was made to a person having ordinary skill in the art to which said subject matter pertains. Patentability shall not be negated by the manner in which the invention was made.

4. Claims 1-41 are rejected under 35 U.S.C. 103(a) as being unpatentable over Gilbertson, Roger, US patent no. 6,510,405 Be in view of Trimberger, Stephen, US patent no. 5,650,946.

As per claim 1, Gilbertson discloses a method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses virtual history stack for storing historical simulation data or record for simulation. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claim 2, Trimberger teaches deriving a new set of stimulus data or forcing functions from previously recorded simulation data or history of simulation data.

As per claim 3, Gilbertson discloses sequence of stimulus vector or portion of test sequence would be used to apply to region verification efficiency (col. 3, lines 1-17, col. 4, lines 2-8, col. 5, for example).

As per claim 4, Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses virtual history stack for storing historical simulation data or record for simulation. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching

of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claim 5, Gilbertson discloses simulation efficiency and state coverage during simulation (col. 6, lines 54-67, col. 7, lines 22-53, col. 8, lines 34-60, for example).

As per claim 6, Gilbertson discloses generating new stimuli, test vectors, data transformation for use in valid test (col. 3, lines 7-34, cols. 7-9).

As per claim 7, Gilbertson discloses occurrence of the taken stimulus in the current validation (Fig. 4, col. 7, lin 62 to col. 8, line 12), using the current stimulus for subsequent steps if needed to valid a test (see above and col. 8, lines 13-43), and timing restriction rules such as occurrence rules, check states, etc. for stimulus data applied for test validation (cols. 7-9).

As per claim 8, Gilbertson discloses stimulus specification, and state legal for valid test (col. 4, lines 5-8, col. 6, lines 15-35, cols. 7-9).

As per claim 9, Gilbertson discloses current update for simulation test data display.

As per claim 10, due to the similarity of claim 10 to claim 1, and Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and

performing the simulation process using the new set of stimuli data as claimed (cols. 8-9).

Gilbertson discloses virtual history stack for storing simulation data for the design verification.

Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claims 11 and 12, Gilbertson discloses occurrence of the taken stimulus in the current validation (cols. 4, 7 and 8), using the current stimulus for subsequent steps if needed to valid a test (col. 8, lines 13-43), and timing restriction rules such as occurrence rules, check states, etc. for stimulus data applied for test validation (cols. 7-9).

As per claim 13, Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action

and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses the virtual history stack and emulation of the virtual stack data for generating an efficient simulation. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claims 14-18, due to the similarities of claims 14-18 to claims 1, 3 and 7 above, claims 14-18 are also rejected under the same rationales as set forth.

As per claim 19, Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action



and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses virtual history stack for storing historical simulation data or record for simulation. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claim 20, Gilbertson discloses means for deriving a new set of stimulus data from previously recorded simulation data and emulation of virtual stacks, or claimed simulation history data in order to verify the circuit design (col. 6, lines 14-34, lines 54-64, col. 7, lines 36-45, for example).

As per claim 21, Gilbertson discloses means for changing the order in the existing stimuli based the previously recorded simulation data or simulation history as claimed (col. 3, and col. 5),

As per claim 22, Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses virtual history stack for storing historical simulation data or record for simulation. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claims 23-27, claims 23-27 are directed to system for performing steps and system for performing method claims 5-9, claims 23-27 are thus rejected under the same rationales as set forth.

As per claim 28, Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses virtual history stack for storing historical simulation data or record for simulation. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching

of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

Similarly, claims 29-30 are directed to system for performing steps of method claims 2-3 and 7 above, claims 29-30 are thus rejected in like manner.

As per claims 31-36, claims 31-36 are directed to system for performing steps of claims 13-16 above. As Gilbertson discloses method and system for simulating and verifying circuit design with feature limitations substantially similar to the claimed invention (Summary of the Invention). According to Gilbertson, the simulation method includes steps of dividing all possible design states for the design into a plurality of interest validation regions (col. 4, line 66 to col. 5, line 14), recording simulation data in virtual history stack to produce corrective action and valid stimulus test vector (Fig. 5, col. 6, lines 14-44, col. 8, lines 33-60, for example) from the first analysis step, and generating a new set of stimuli by examining from error violation data, for example and performing the simulation process using the new set of stimuli data as claimed (cols. 8-9). Gilbertson discloses the virtual history stack for storing simulation data. Gilbertson does not expressly disclose generating a new set of stimuli by examining the existing stimuli based on the simulation history as claimed. Such feature is however known in the art. In fact, Trimberger teaches a logic simulation. The simulator generates simulation stimuli based on simulation data or simulation history data for efficient logic simulation (col. 4, lines 38-62, col. 6, line 32 to col. 7, line 42, for example) such as increasing design speed, reducing design simulation time, etc. (col. 4, lines 1-35).

This would motivate practitioner in the art at the time of the invention was made to modify Gilbertson virtual history stack for historical simulation data by combining the teaching of Trimberger of generating stimuli data applied to logic circuit based on simulation history in order to efficiently simulate the design circuit as taught in Trimberger.

As per claim 37, Gilbertson discloses stimuli vector specified for circuit simulation (Figs. 4 and 5, col. 6, lines 15-35, lines 45-50, cols. 7-8).

As per claim 38, Gilbertson discloses parts of system design imply the claimed step of dividing design states into a plurality of regions (Fig. 1, block 12, and col. 5, lines 1-8, for example). Gilbertson also discloses storing simulation results in various memory regions or in memory stacks as claimed.

As per claim 39, Gilbertson discloses mapping function for mapping simulation values and the results of simulation are stored in virtual history stack for tracing (Figs. 4, 5, col. 6, lines 14-44, cols. 7-8, for example).

As per claims 40-41, Gilbertson discloses logic design simulation and validation with virtual history stack for functional mapping state values relevant to particular simulation events as claimed.

### ***Response to Arguments***

5. Applicant's arguments with respect to claims 1-41 have been considered but are moot in view of the new ground(s) of rejection.

*Conclusion*

6. Any inquiry concerning this communication or earlier communications from the examiner should be directed to patent examiner Thai Phan whose telephone number is (703) 305-3812.

Any inquiry of a general nature or relating to the status of this application should be directed to the Group receptionist whose telephone number is (703)305-3900.

**Any response to this action should be mailed to:**

Commissioner of Patents

P.O. Box 1450  
Alexandria, VA 22313-1450

**or faxed to:**

(703) 872-9306, (for formal communications intended for entry)

Hand-delivered responses should be brought to Crystal Park II, 2121 Crystal Drive, Arlington, VA., Sixth Floor (Receptionist).

January 11, 2004

*Thai Phan*  
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